

Colles' Fracture

A Method of Maintaining Reduction

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SUMMARY

A major difficulty in the treatment of Colles' fracture is maintenance of reduction. Wedging of the cast, a procedure used in dealing with other orthopedic conditions, was adapted to the treatment of Colles' fracture and was employed in 23 cases. In most of them the method was effective in preventing displacement.

A SATISFACTORY result of treatment of Colles' fracture depends on three factors: (1) There must be adequate reduction of the fracture; (2) the reduction must be maintained until solid bony union takes place; (3) the joints of the hand and of the shoulder must be freely active during the entire course of treatment.

Of the three requirements, probably the most difficult to achieve is maintenance of reduction until union is solid. It is disconcerting to find, after a perfect initial reduction and application of a seemingly adequate plaster cast, that a deformity of the wrist has, nevertheless, occurred during the period of healing within the cast.

The importance of maintenance of reduction has been recognized in various attempts to circumvent the hazard of displacement: Skeletal traction and skin traction have been incorporated into the application of the plaster. Repeated tightening of the primary anterior and posterior splint has been employed. The purpose of this presentation is to describe a method in which the principle of wedging is applied to the cast for Colles' fracture.

METHOD

The fracture is reduced as soon as possible after the injury by means of manual traction and counter-traction and by manual disimpaction of the fracture. A strip of two thicknesses of sheet wadding 1 inch wide is wound around the site of the fracture. A posterior splint of about four layers of wet plaster of paris is placed on the dorsum of the forearm from the metacarpophalangeal joints to the elbow. This splint is fixed to the arm by a flannel bandage, cut at frequent intervals to prevent wrinkling. The wrist is held in the position of correction, ulnar deviation and volar flexion, until the plaster hardens. A roll of plaster of paris is applied to the flannel-covered forearm splint. The forearm is thus well immobilized. The elbow joint then is immobilized by additional plaster of paris bandages. The skin of the

upper arm and the elbow may be protected from the plaster by a layer of sheet wadding, since this part of the cast need not fit tightly. After splinting and bandaging is completed, lateral and anteroposterior roentgenograms of the wrist are made. The patient is instructed in the importance of early motion of the fingers and of the shoulder joint, and is warned to report any inordinate swelling or pain.

The foregoing constitutes little deviation from standard procedure. Now the variation: Two or three days after the reduction, the cast is cut circularly (preferably with a Stryker cast cutter) at the level of the fracture. Only a small bridge of plaster is left on the volar and ulnar borders of the wrist. Small wedges of wood (pieces of tongue depressors) are inserted on the radial side of the aperture in the cast. The aperture and wedges are fixed by several layers of adhesive plaster. Anteroposterior and lateral roentgenograms are made of the wrist. If position is satisfactory, the adhesive plaster is covered with a few turns of plaster of paris.

The initial cast is left in place for four or five weeks and a short posterior skin-tight plaster splint is employed for an additional three or four weeks.

RESULTS IN TWENTY-THREE PATIENTS

This method was employed in a consecutive series of 23 patients with displaced Colles' fracture. Undisplaced fractures were not treated by this method. In each there was a comminuted fracture of the distal end of the radius with mild, moderate, or severe displacement. The ulnar styloid process was fractured in all cases. As all the patients were treated in private practice, it was possible to keep them under observation for the appearance of pressure necrosis which it was thought might occur because of the tight cast. Such a complication did not occur.

A specific routine of treatment was not followed. The only common denominators were: First, the long cast extending above the elbow; second, wedging of the primary cast within the first few days after initial treatment; third, a short, skin-tight, posterior splint of plaster extending to the elbow following removal of the primary cast. The two casts were left in place for variable lengths of time. Immobilization was discontinued as soon as bony union was thought to be present as judged by roentgenologic and clinical evidence. Tables 1 and 2 summarize the schedules of treatment and the end results.

There were no untoward complications as a result of the procedure. In two or three cases the casts had to be split because of edema of the fingers. The patients did complain of more pain after the cast was wedged than they had before the wedging. One

patient had a moderate clinically apparent deformity as a result of the fracture but this took place after the plaster cast was removed; the cast had been removed too early. In one case there was some displacement of the fracture after wedging.

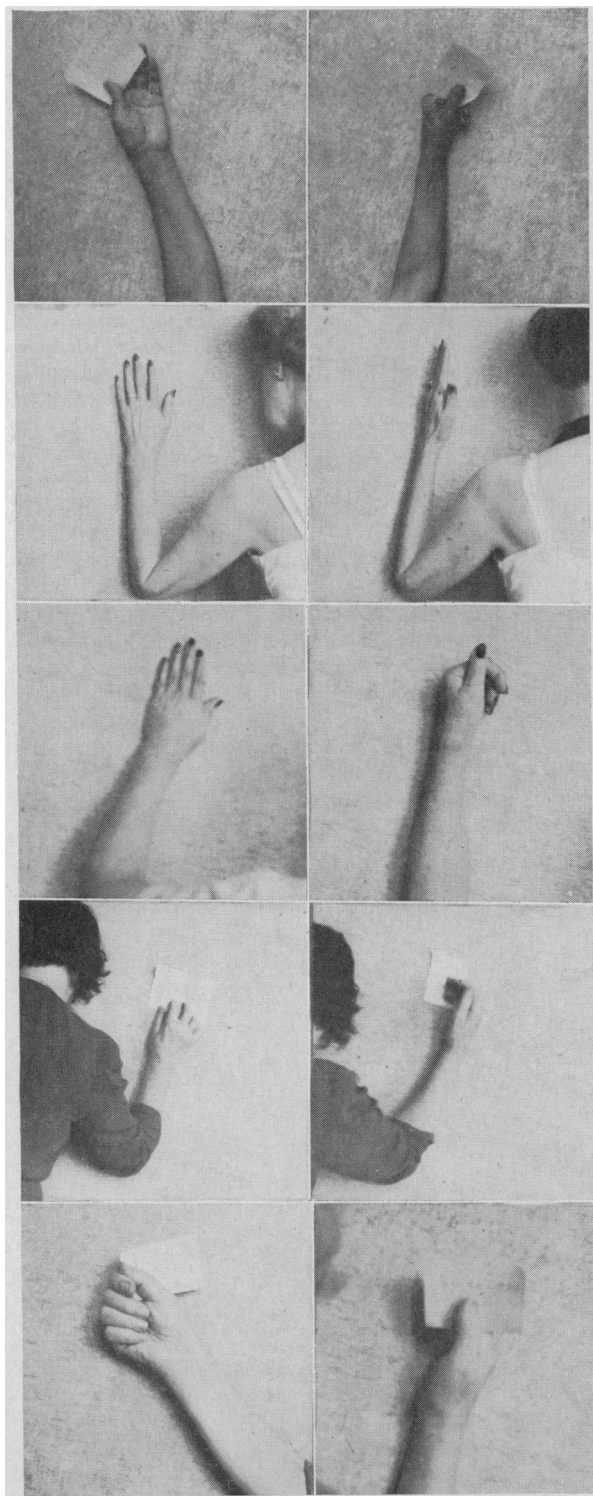


Figure 1. Each horizontal pair of photographs represents two views of the result obtained in a single patient.

ANESTHESIA

Five of the patients were given 8.0 mg. or 10.0 mg. of morphine intravenously. Of the 23 patients, 21 were given procaine* intravenously. These patients first were given 1 ounce of whiskey orally to counteract the effect of the procaine to be administered. Twenty cc. of a 0.5 per cent solution of procaine was instilled intravenously, slowly over a period of three minutes. Neither local nor inhalation anesthesia was employed in this series. Local infiltration has the theoretical hazard of increasing tissue edema. General anesthesia would have increased the expense of treatment, although it would be indicated in cases in which analgesia is not produced by the intravenous use of procaine. In this series, however, procaine given intravenously produced satisfactory analgesia in all cases in which it was used. Anesthesia or analgesia was not required for the wedging procedure although it caused moderate pain.

DISCUSSION

The use of wedging or rimming of plaster casts for the correction of recent fracture deformities is not, of course, new. Kite has used wedged casts for many years to correct congenital equinovarus. Previous reports on the use of the wedged cast for the

*For routine use, general anesthesia is safer than anesthesia by procaine given intravenously.

TABLE 1.—*Clinical Data and Schedule of Treatment in 23 Cases of Colles' Fracture*

Case	Age	Months of Follow-Up	Degree Displacement (X-Ray)		Time in Cast Day Cast Wedged	Time in Cast	
			Antero-posterior	Lateral		First Cast Days	Second Cast Days
1	52	10	65	50	2nd	12	13
2	37	3	105	90	2nd	30	21
3	26	5	110	75	3rd	30	21
4	78	17	115	70	1st	14	7
5	62	18	105	85	6th	30	30
6	53	19	115	75	2nd	30	21
7	55	25	110	85	3rd	21	14
8	63	1	105	75	1st	3	9
9	52	25	105	75	1st	21	4
10	40	16	85	50	1st	14	21
11	66	9	105	75	3rd	21	11
12	50	10	105	80	4th	21	12
13	75	32	110	75	3rd	17	7
14	64	16	95	70	3rd	21	5
15	46	24	105	70	2nd	14	11
16	37	20	90	65	1st	21	14
17	51	9	105	65	1st	9	14
18	56	20	95	75	1st	33	14
19	54	12	80	65	1st	30	14
20	62	11	70	65	6th	35	14
21	65	3	90	65	5th	30	10
22	55	9	80	65	3rd	30	21
23	65	7	90	80	6th	30	21

In all but three cases fracture was reduced at office with intravenous administration of procaine. In Cases 6 and 19 reduction was done at hospital with pentothal given intravenously. In Case 22 reduction was done at hospital with procaine given intravenously.

TABLE 2.—End Results in 23 Cases of Colles' Fracture

Case	Degree of Anatomic Reduction (Roentgenologic)		Result			
	Antero-posterior	Lateral	Stiffness		Pain	Cosmetic
			Wrist	Hand		
1	115	85	None	None	None	Excellent
2	110	90	None	None	None	Excellent
3	110	80	None	None	None	Excellent
4	115	90	None	None	None	Excellent
5	110	90	None	None	None	Excellent
6	110	90	None	None	None	Excellent
7	115	90	None	None	Slight, occasionally	Good
8	110	90	None	None	None	Excellent
9	110	90	None	None	None	Excellent
10	110	70	Slight (20% loss of supination) Patient well satisfied	None	Slight, occasionally	Good
11	110	90	None	None	None	Excellent
12	110	90	None	None	None	Excellent
13	105	75	None	None	None	Good
14	110	85	None	None	Slight	Excellent
15*	110	80	None	None	Slight, occasionally	Good
16	105	90	None	None	None	Excellent
17	105	75	None	None	Slight	Good
18†	115	90	None	None	None	Excellent
19	110	90	None	None	None	Excellent
20	110	75	Slight	None	Slight	Fair
21	110	90	None	Slight	Slight	Excellent
22	110	80	None	None	None	Excellent
23	105	90	None	Slight	Slight	Fair

*Delayed union as cast was removed too soon. Remanipulated eleven weeks after the injury because of increasing deformity. Under pentothal anesthesia fracture was found to be not solidly united. Second manipulation, cast wedged on second day. New cast applied after one month. Short cast off after three weeks.

†Cast and reduction by a physician in another city.

prevention of deformity in Colles' fracture, however, have not been found in the literature.

The wedging procedure has several advantages. It may possibly overcome small amounts of deformity not reduced primarily. It prevents recurrence of the deformity in the cast in most cases. It obviates the necessity for skeletal traction in most fractures of the distal end of the radius. The wedged cast cannot be depended on to prevent deformity in all cases, however. In extremely comminuted and disorganized fractures it probably will continue to be necessary to use skeletal traction by means of a wire through one or more metacarpal bones or to accept deformity of the wrist and perform a reconstructive procedure when some solidification has occurred.

Plaster immobilization must be maintained an adequate length of time. It is easier to relieve stiffness of the wrist than to correct a bony deformity. Active motion of the fingers and of the shoulder must be maintained throughout the period of plaster immobilization.

It should be emphasized that this method of treating Colles' fracture necessitates experience in non-padded techniques, frequent roentgenograms and frequent observation of the patient's hand and arm.

Perfect anatomic reduction is not claimed for this method. However, it can be used with benefit in selected cases. And although there may be imperfections in reduction as observed roentgenographically, the method assures an acceptable result from the standpoint of the patient. Both the cosmetic results and the functional results, the latter measured in terms of lack of pain and of stiffness, were satisfactory in the series here reported.

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